

## Cloudy Analemma

Scris de István Mátis

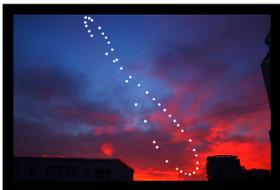
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In January of 2014 I completed an analemma photo started over a year. This way I became the [second](#) in Transylvania and Cluj-Napoca and the [third](#) in Romania to make such photo.

The discs of the Sun are taken from the window of a flat between 11/6/2012 and 1/19/2014 at 7:00 UT, which is 9'o clock in the morning local time during winter and 10'o clock during daylight saving time. The background is made on 1/14/2014 at 7:55 local time, from the original location of the analemma.



## What is an analemma?

In short it is the curve which shows the movement of the Sun on the sky, when photographed every day at the same time from the same location for a year. On Earth this curve has an eight like shape which is determined by the sum of two independent factors:

1. The tilt of the rotational axis of Earth to the normal of its orbit. This defines the longitudinal size of the analemma.
2. The elliptic orbit of the Earth around the Sun. Because of this the Earth can be closer or further away from the Sun. This defines the width of the analemma.

Photographing an analemma is not simple, it requires much attention and planning.

## Photography challenge

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During the shots I made always two frames, similar to the first Hungarian analemma [photographer](#): one with a solar filter on which only the disc of the Sun can be seen, and one without a filter. Although the Sun burned in in this one, the surroundings could be seen well – with these photos finally I managed to align all the solar discs. As a solar filter I used a Baader solar filter for photography.

Despite the simple definition the analemma is quite a challenge to photograph. It can be influenced and spoiled by many things, of which I will list a few:

- The first is always the weather: because of the temperate continental climate in the autumn and winter months the weather is frequently cloudy and rainy. Besides Cluj-Napoca is situated in a valley along the Somes river which can cause frequently fog too. On such days photographing the Sun is impossible.

- The precise placement of the camera and of the tripods are essential. The camera must be in the same position every day when a photo is taken. Some dedicate a separate camera for this task and even cast the tripod into concrete. I used my camera for other shootings and I also had to close my windows. Because of this I hardened my tripod with some wires and placed the tripod into a well marked and secured location. I seldom removed the head of the tripod from the camera. During shooting I used Canon's "Mirror Lockup" function to avoid further the movement of the camera.

- Timing: it was not simple to find a reliable time source. All the clocks of mobile phones, cameras and computers either tick too fast or too slow. During a year this can accumulate to a considerable amount of minutes, which in turn can cause the discs of the Sun to move out of the analemma. To avoid this I synchronized all my clocks with the internet time using NTP (the Network Time Protocol), which has microsecond precision.

- Lens distortion: because of the small focal length the lens of my camera had a considerable amount of distortion. This can affect the alignment of the solar discs. The solution was to use the panorama software Hugin, which corrected these distortions and I also used it to align images with success.



## Some peculiarities of the analemma

- The equinox points are on the middle line, when we divide the analemma evenly along its height.

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In 2013 the dates of the equinoxes were March the 20st and September the 22nd.

- The solstice points are the peaks of the analemma. The summer solstice was on June the 21st, and the winter solstice was on December, the 21st.
- In the northern hemisphere always the smaller loop is on top, in the southern it is on the bottom.
- One can not photograph a full analemma beyond the polar circles towards the poles.
- The dates of the latest and earliest sunrise can be determined in the location of the analemma: these are the dates of the lowest point of the analemma (closest to the horizon) and the highest point respectively.

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